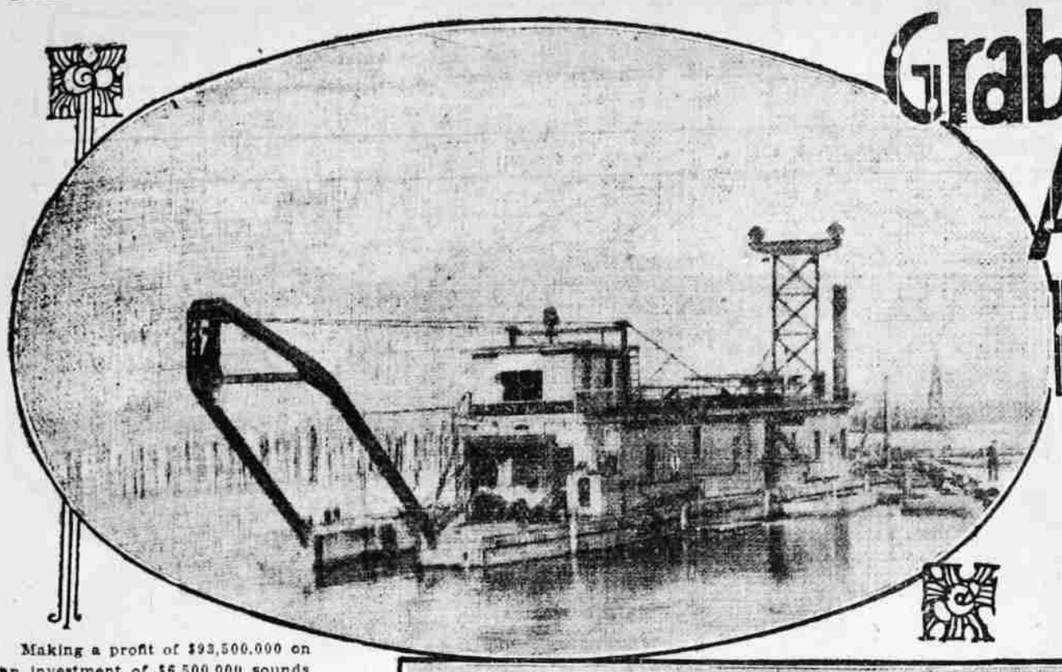
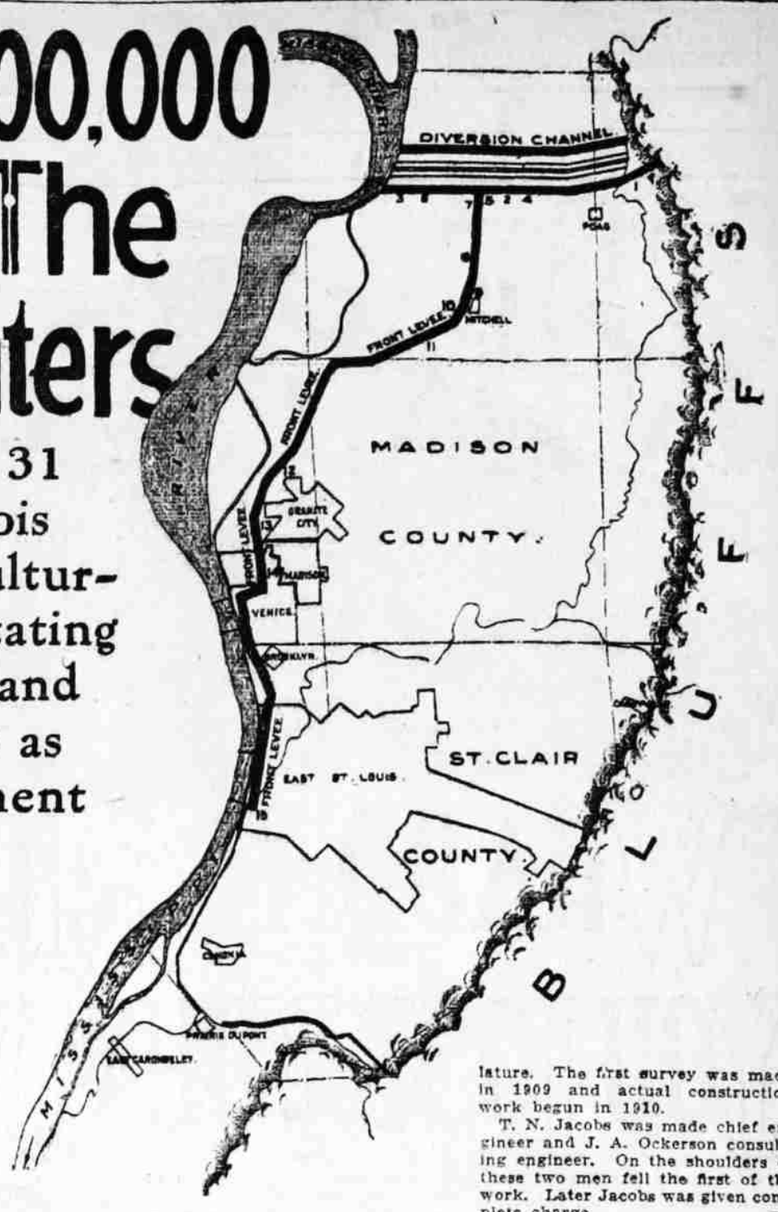
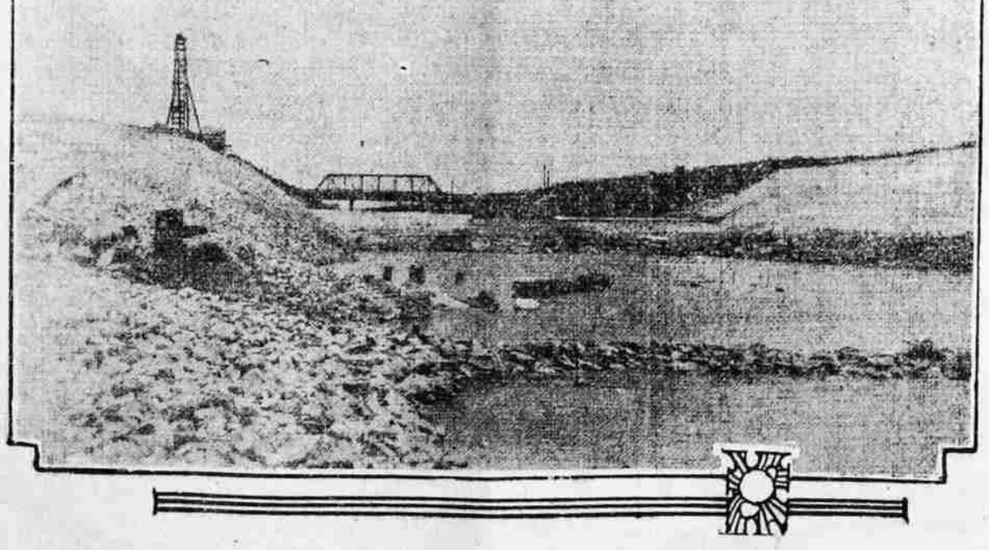


Grabbing $100,000,000 Away From The Father Of Waters

How a Levee Wall 31 Miles Long in Illinois Reclaims Vast Agricultural Region from Devastating Floods and Stands as Monument to Engineering Ingenuity.



FROM upper left to bottom: Electric hydraulic dredge in operation on Mississippi; discharge pipes through which water equal in amount to the Mississippi River for three miles at flood stage will pass; T. N. Jacob, chief engineer levee and sanitary district; dam in division channel. Upper right: Map showing wall and territory that will be reclaimed.



Making a profit of $93,500,000 on an investment of $6,500,000 sounds like frenzied finance in its most frenzied exposition by Tom Lawson, but it is being done by the State of Illinois.

By this investment $100,000,000 is being snatched from the greedy maw of the Mississippi, and the Father of Waters is minus just so much of the tribute which from time immemorial he has demanded, and taken, from Illinois.

The $100,000,000 is the value of the land which is being reclaimed from the ravages of the river by the East Side Levee and Sanitary District, a municipality division of the State created for the express purpose of winning back from the river this land. It includes seven cities, but has jurisdiction over the government of none.

Its powers as regards the levee work are as almost absolute as those governing the Panama Canal Commission. It appoints its own police officers and sends them out to work in the cities and villages within the district. It enacts tax ordinances and provides for the collection of these taxes.

The municipality is governed by a Board of Trustees elected every four years. This board has complete control. It appoints a chief engineer, a clerk, a treasurer and attorneys. The president of the board receives a $2,000 salary; the other members, $1,000.

Now this "municipality" which they govern extends 150 square miles in the territory opposite St. Louis. It includes East St. Louis, with a population of 80,000; Venice, Granite City, National City, Madison, Brooklyn, Naemoki and Cahokia, all thriving cities in themselves.

Thirty miles of this territory is along the river front, and the Cahokia Creek meanders through part of it on its way to meet the Mississippi.

VENICE AT TIMES HAS ITS GRAND CANALS.

Venice was aptly named, and its conditions may speak for those in the other cities. In the spring and early summer, and occasionally at other times, the residents of Venice would wake up in the morning to find that the river had paid them a call, had made himself at home and intended to stop a while.

Although the good residents didn't have gondolas and guitars, they took unto themselves flatboats and scows and went about their business cheerfully.

But the farmers in the territory were not so cheerful. The river was no respector of crops or planting times and, accordingly, there was frequently a very heavy loss in the district. The drainage was poor and the health of the citizens consequently bad. Something had to be done, and so the trustees got to work.

They set about to discover the cause of the frequent waterway rampages and found that Cahokia Creek was fed from a watershed 200 square miles in area, lying northwest of the municipality. During heavy rains Cahokia Creek would rise.

The Mississippi would follow suit. It would spread some water over the western area, and while the residents were busy keeping that out some more water would sneak up Cahokia Creek, meet the heavy floods coming down from the highlands and flood the central section. The farmers were at their wits' end.

They looked over the Mississippi and decided that the building of a levee high enough to keep out the water was sufficient for that problem. Then they turned to the turbulent Cahokia and learned that they had a task on their hands.

The first problem was to prevent that water from the Mississippi sneaking in the side door while the front door was being watched. Big flood gates were built at the mouth of the creek, and these may be closed during high water and the Mississippi runs straight by, to cut its capers in the lowlands further south.

Then they turned to the back door. It was found that as soon as the Cahokia Creek emerged from the highlands during the wet weather it began to wander over the fields. Then they began to dig.

A channel was cut from the headwaters of the creek to the Mississippi, turning much of the water from the plateau to the west, and not giving it a chance to get into the lowlands.

This cut was named Diversion Channel. It was made 100 feet wide and 20 feet deep, and at the top of the banks are dykes 10 feet high, made of the clay taken from the channel's bed.

The channel prevented overflow from the north, and the floodgates guarded the south. Then came the west. The engineers built a levee thirty-one miles long, three and a half feet higher than the highest flood record, set in 1844, and seven feet higher than the record of 1903. Only a catastrophe will bring the water over these banks.

These three works cut off from Illinois a triangular piece of land, making it to all intents and purposes an island. There is water on all sides. The extreme northern point is a village called Poag, and here Diversion Channel and Cahokia Creek make their adieus to one another.

FIVE BRIDGES OVER THE CHANNEL.

Over Diversion Channel there are five railroad bridges and four highway bridges, placed where the roads crossed before the channel was dug. The expenses of these nine structures were paid by the district, although it is the Illinois law that where the alteration or reconstruction of a railroad bridge is necessitated in improving the channel of a stream, the railroad shall pay for the work. It was held that this being new work, the roads were under no obligation.

Four miles from the head of Diversion Channel there is a dam over which the water plunges to a level seven feet lower, made to check the flow of the water, which would eat away the banks.

The water passing through Diversion Channel, a distance of four and a half miles, formerly traveled thirty miles through the lowlands to the Mississippi in Cahokia Creek. The bed of Diversion Channel at its head is about 25 feet higher than the low water mark in the Mississippi. Thus the water traveling four and a half miles would fall 5 feet to the mile.

This caused a dangerous speed, which would force the water to eat away the banks, undermine the bridges and concrete work, and cause a flood, and for this reason the dam was built.

The dam is four miles from the head of the channel, and is eight feet lower than the headwaters of the channel. The banks on each side of the dam are protected with a facing of concrete and rip rap, to withstand the rush of the stream, where the force is concentrated.

After passing over the first dam, the stream runs about 200 feet and then falls over another dam to the river level and goes on to the Mississippi. The two dams give the channel a fall of two feet to the mile, eliminating three fifths of the velocity.

SAVING OF $350,000 ON BETTER EQUIPMENT.

Diversion Channel was built at a cost of $850,000, against an estimated cost of $1,200,000, effecting a saving of $350,000 and giving the channel better equipment than in the original specifications.

Diversion Channel joins the Mississippi just west of the Alton, Granite & St. Louis Railroad system, and it is at this point that the levee begins, a mile and a half inland from the river.

The river front property owners in this district, all flat country, refused to bear their expenses in erecting the levee so the structure was made in back of their lands, leaving them exposed to the pranks of the river's rises.

At Mitchell, owing to the topographic conditions, it was found impossible to build a clay levee of the usual type, and the engineers substituted a concrete wall. This is five feet wide at the bottom, two at the top and is five feet high. It extends a quarter of a mile, and offers an impregnable bulwark to the encroachments of the river.

In this section the land for the construction of the wall was turned over to the district by the Chicago & Alton Railroad without price. The levee trustees were granted the right of eminent domain, but in a few instances were they compelled to invoke this power, for in most cases the property owners, realizing the immense benefit of the project to their holdings, turned over the desired land without any compulsion. It was rarely that legal proceedings were adopted.

From Mitchell the levee runs westward to Chouteau Island, about ten miles north of East St. Louis, and here turns to the southwest and runs to Venice, where it swings into the river front and follows the Mississippi's course. It cuts off Granite City, Venice and Madison from all flood danger.

ALLOWANCE FOR DRAINAGE DELICATE PIECE OF WORK.

At this point a delicate piece of construction work was necessary. The Mississippi is used by these municipalities for a sewer, and allowances had to be made for the drainage.

Steel sewer pipes and water pipes were laid and surrounded with immense concrete jackets. The levee was built above them, and at high water the drainage is pumped underneath the levees through these sewers.

The concrete jacket is to guard against any damage that might result from a bursting of the steel pipes, and consequently there is a double protection, as in an emergency the jackets may be used as pipes. If there were no such protection one broken pipe would cause the levee to collapse and admit the river.

Automatic flood gates protect the drainage of the roads on the inner side of the levee. These hang vertically. When the river is high the pressure of the water shuts the gate. When it is low the outward pressure of the drainage water opens them.

To guard against emergencies there are a number of small, hand operated flood gates to prevent an influx of water in case the automatic gates become clogged.

To this point, with the exception of the concrete wall, the levee is built entirely of clay. It is planned to face it with concrete later, but to add strength while the work was being completed both sides of the gigantic dike were sown with blue grass. This holds the soil together and prevents the sliding usually caused by rains and the wash of the current.

BRIDGE APPROACH IS PART OF LEVEE SCHEME.

At Chouteau Island the levee turns to the south and reaches the river front at the Illinois approach of the Merchants' Bridge from St. Louis. This approach was utilized as a part of the levee scheme.

It is heavily armored with concrete, as well it need be, for here the river makes a sharp turn and the approach gets the full force of the entire current. The coating was continued for some distance beyond the approach, with a heavy application of rip rap.

South of this approach the engineers utilized the waste of the foundries in the neighborhood for the building of their project. This waste was the slag, which ordinarily was thrown away. But experiment showed that the slag served for as good a facing as rock and eliminated two-thirds of the cost. It was requisitioned and placed in service, mixed with foundry sand.

The action of the water upon this mixture causes it to pack and form a surface almost as solid as concrete. It gives the levee a black, forbidding appearance, but is the strongest point of the entire construction. This was the first time slag was used for such purpose, and the idea originated with the levee trustees.

Right at this point a new bank is being made, much after the style in which the Dutch in Holland reclaimed land. About 100 yards from the shore a double line of piling has been driven into the river bed marking the new line. Against the inner line a heavy willow mattress, loaded with stone, was sunk, and the piling utilized as a backbone for a rock wall.

The mattress, being flexible, will adjust itself to any depression in the river bed, and more rock always can be piled on. Behind this the land will be filled in and the river will not be given a chance to work its way under the base of the levee.

Back of the levee at this point are 150 acres of land which the levee trustees are raising twenty-five feet. For this purpose they are using the soil from the river bed, which is sucked up with the water by a dredge, forced through a twenty-foot pipe and discharged a quarter of a mile inland. The water finds its way back to the river through a flume.

The power to operate the pump, driven by a 1,000 horsepower motor, is supplied from the Keokuk dam. The pipe deposits about 15,000 cubic yards of soil every twenty-four hours, and it is estimated that when the entire work is finished enough soil will have been taken from the river to fill 171,428 railroad dirt cars.

A part of the filled land will be occupied by railroad switch yards, expected to be the largest and most complete in the world, accommodating more than 10,000 cars.

ANOTHER NEW SHORE LINE ON THE EAST SIDE.

In front of East St. Louis, along the levee front, another new shore line is being built for a distance of three miles. The levee here is built of concrete.

The building of the East St. Louis levee was done to allow for the tremendous traffic which will result from the opening of the Panama Canal and the deepening of the Mississippi channel.

The levee is ten feet higher than street level, and eighteen feet above low water. To eliminate the wasted energy in driving wagons over the top of the levee to the boats, enclosed inclined planes have been built, opening through flood gates.

These are to be used at low water. At high water the flood gates are closed, but other inclined planes are provided, passing over the top of the levee.

For three miles along the waterfront of East St. Louis a limestone wharf is being constructed, extending from the top of the levee to the shore, sloped one foot for every eight in length.

At the end of the levee here are the Cahokia flood gates. These are built in the same style as the gates at Madison and Venice, to open and close automatically, and with hand power for emergencies. There are three gates, and these, 600 feet of wharfage and one culvert, were built at a cost of $50,000. The gates are made of steel and require little attention.

South of Cahokia Creek the levee is of clay, covered with the bluegrass. At Arsenal Island it moves inland again to the bluffs.

TO USE CAHOKIA CREEK AS DRAINAGE CHANNEL.

The district trustees are working out a comprehensive system of drainage for the district, in which Cahokia Creek will be used as a drainage canal. Another canal will be dug at the east side of the area, running parallel with the bluffs, to carry away the drainage from that district and the eastern and southern portions of the reclaimed area.

The first flood protection work of the district dates from the flood of 1907, when the East Side Levee Association was organized. A fund of $25,000 was raised and work begun which resulted in the organization of the district by the Illinois Legislature. The first survey was made in 1909 and actual construction work begun in 1910.

T. N. Jacobs was made chief engineer and J. A. Ockerson consulting engineer. On the shoulders of these two men fell the first of the work. Later Jacobs was given complete charge.

Jacobs saw three years' service as an engineer with the United States Army in levee construction and river improvement work on the Upper Mississippi. He is 47 years old.

How Zeppelin Triumphed.

When the German naval airship Zeppelin L1 was wrecked recently, it called attention to the remarkable development of this type of airship since Count Zeppelin, thirteen years ago, made his first successful flights in a rigid dirigible of his own design. The L1 was a veritable monster of the air.

Her length was 525 feet, three-and a half times the height of the Nelson Monument in Trafalgar Square, and her diameter 50 feet. But in spite of her huge size she could travel faster than an express train. Propelled by three engines, each of 170-horsepower, the L1 could attain a speed of 52 miles an hour, rise to a height of one mile, and actually could carry a weight of seven tons over and above her engines, cars and fittings.

In addition to a crew of twenty men, the L1 carried four machine guns, and also was fitted with a wireless telegraphy installation capable of sending messages 350 miles.

More than $50,000 was spent in the construction of this airship. The life of an airship, however, is assumed by the German authorities to be only four years, so that normally every four years new airships have to be substituted for the old. This is the first occasion that life has been lost in connection with a Zeppelin airship, although eleven others have either been wrecked or badly damaged.

Count Zeppelin has triumphed in the face of difficulties and opposition which would have daunted 99 men out of 100. The army authorities were strongly opposed to his ideas of a rigid dirigible, although the Kaiser supported the Count in his experiments, and when in 1905 the Count constructed an enormous airship 420 feet long and 40 feet in diameter, experiments with which ended in comparative failure, the army authorities were inclined to ridicule his ideas.

The following year, however, Zeppelin built another dirigible, in which he made a flight of 225 miles and attained a speed of 35 miles an hour. This achievement excited the wildest enthusiasm in Germany, where people had been made somewhat uneasy by the success which had attended the use of dirigibles in France, and ultimately a national subscription was organized and $1,500,000 raised to enable the Count to continue his experiments.

The dirigible baloon, however, is by no means a modern invention, as many people seem to think. As a matter of fact, as long ago as 1784 General Meusnier proposed the construction of an elongated balloon which might be propelled through the air.

Experiments were made with it by two brothers named Robert, who made several ascents and attained a speed of three miles an hour, though the method of propulsion was only aerial oars worked by hand.

Nothing further was attempted until 1852, when Henri Giffard built dirigibles which, by means of a light steam engine, he propelled at nearly seven miles an hour, and since then various experiments have been made which ultimately ended in the wonderful triumph of Zeppelin.

He Knew.

"Now," said the photographer to the young man, "it will make a much better picture if you put your hand on your father's shoulder."

"Humph," grunted the father. "It would be more natural if he put it in my pocket!"

Artillery officers of the United States Army have succeeded in directing the fire of coast defense guns from points as far distant as eight miles.